

AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A fuel cell system comprising: including
an anode, a cathode, and an ion exchange membrane between the anode and the cathode;
~~therebetween, and having~~
a fuel delivery conduit comprising:
a fluid flow field plate forming part of the anode, having a fluid flow
channel extending through the fluid flow plate;
a fuel delivery inlet coupled to one end of the fluid flow channel;
a fuel delivery outlet coupled another end of the fluid flow channel; and
a fluid flow regulator for controllably varying a quantity of fuel delivered
to a mixing point in the fuel delivery inlet; and
a recirculation conduit extending between the fuel delivery outlet and the mixing point,
wherein the mixing point comprises either (i) a reaction chamber for reacting fuel, or (ii) a pre-
mixing chamber, the mixing point for mixing fuel from the fluid flow regulator with oxidant
species from the recirculation conduit for supplying fuel from a fuel source to an active surface
area of the anode and further comprising means for effecting a controlled combustion of fuel and
oxidant species within the fuel delivery conduit.

5. (Currently Amended) A fuel cell system according to claim 4, wherein ~~in which~~ the reaction chamber includes a catalyst material.

6. (Canceled)

7. (Currently Amended) A fuel cell system according to claim 3, wherein ~~in which~~ the recirculation conduit is switchably connected to the fuel delivery outlet ~~by way of~~ via a two way valve.

8. (Currently Amended) A fuel cell system comprising:
an anode;
a cathode;
an ion exchange membrane between the anode and the cathode, the ion exchange
membrane comprising:
a fuel delivery conduit for supplying fuel from a fuel source to an active
surface area of the anode; and
means for effecting a controlled combustion of fuel and oxidant species
within the fuel delivery conduit; and
~~A fuel cell according to claim 1 further including~~ detection means for detecting a level of oxidant species present in at least part of the fuel delivery conduit.

9. (Currently Amended) A fuel cell system according to claim 8, ~~wherein in which~~ the detection means comprises means for testing an open circuit voltage across the anode and cathode of the fuel cell.

10. (Currently Amended) A fuel cell system according to claim 3 ~~further including 1,~~
further comprising:

control means for switching the fuel cell between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered to the anode together with oxidant delivered via the recirculation conduit.

11. (Currently Amended) A fuel cell system according to claim 3 ~~further including 1,~~
further comprising:

control means for switching the fuel cell between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered into the fuel delivery conduit together with oxidant delivered via the recirculation conduit.

12. (Currently Amended) A fuel cell system according to claim 2 ~~in which the means for effecting a controlled combustion of fuel and oxidant species within the fuel delivery conduit comprises 1, further comprising:~~

an oxidant supply conduit extending from an oxidant supply to a the mixing point ~~in the fuel delivery inlet.~~

13. (Currently Amended) A fuel cell system according to claim 12, ~~further including comprising:~~

an oxidant flow regulator for controllably varying ~~the~~ a quantity of oxidant delivered to the mixing point.

14. (Currently Amended) A fuel cell system according to claim 13, wherein ~~in which~~ the oxidant flow regulator comprises a valve coupling the oxidant supply conduit to a cathode oxidant delivery conduit.

15. (Currently Amended) A fuel cell system according to claim 12, wherein ~~in which~~ the mixing point ~~comprises~~ is a reaction chamber for reacting fuel from said fluid flow regulator with oxidant species from said oxidant supply conduit.

16. (Currently Amended) A fuel cell system according to claim 15, wherein ~~in which~~ the reaction chamber includes a catalyst material.

17. (Currently Amended) A fuel cell system according to claim 1, further ~~including~~
comprising:

means for effecting a controlled combustion of fuel and oxidant species within a cathode
fluid delivery conduit.

18. (Currently Amended) A fuel cell system according to claim 17, ~~wherein in which~~ the
cathode fluid delivery conduit comprises:

a fluid flow field plate forming part of the cathode, the fluid flow field plate comprising
~~having~~ a fluid flow channel extending through the fluid flow field plate ~~therethrough~~;

an oxidant delivery inlet coupled to one end of the cathode fluid flow ~~channel~~ conduit;
and

an exhaust outlet coupled to another end of the cathode fluid flow ~~channel~~ conduit.

19. (Currently Amended) A fuel cell system according to claim 18, ~~wherein in which~~
~~said the~~ means for effecting a controlled combustion within a cathode comprises a fuel supply
conduit extending from ~~an~~ a fuel supply to a mixing point in the oxidant delivery inlet.

20. (Currently Amended) A fuel cell system according to claim 19, ~~wherein in which~~ the
mixing point comprises a reaction chamber for reacting fuel from ~~said the~~ fuel supply conduit
with oxidant species from said oxidant supply.

21. (Canceled)

22. (Currently Amended) A fuel cell system according to claim ~~21~~ further including 26,
further comprising:

a fluid flow regulator for controllably varying the quantity of fuel delivered to the mixing point.

23. (Currently Amended) A fuel cell system according to claim ~~21~~ in which 22, wherein
the mixing point comprises a reaction chamber for reacting fuel from ~~said~~ the fluid flow
regulator with oxidant species from ~~said~~ the recirculation conduit.

24. (Currently Amended) A fuel cell system according to claim ~~22, wherein 21 or claim~~
~~22 in which~~ the mixing point comprises a pre-mixing chamber for mixing fuel from ~~said~~ the fluid
flow regulator with oxidant species from ~~said~~ the recirculation conduit.

25. (Currently Amended) A fuel cell system according to claim ~~21 in which 26, wherein~~
the recirculation conduit is switchably connected to the fuel delivery outlet ~~by way of~~ via a two
way valve.

26. (Currently Amended) A fuel cell system comprising:

a fuel cell comprising an anode, a cathode, and an ion exchange membrane between the anode and the cathode;

a fuel delivery conduit comprising:

a fluid flow field plate forming part of the anode, the fluid flow plate comprising a fluid flow channel extending through the fluid flow plate;

a fuel delivery inlet coupled to one end of the fluid flow channel; and

a fuel delivery outlet coupled another end of the fluid flow channel;

a recirculation conduit extending between the fuel delivery outlet and a mixing point in the fuel delivery inlet; and

~~A fuel cell system according to claim 21 further including~~ detection means for detecting a level of oxidant species present in at least part of the fuel delivery conduit.

27. (Currently Amended) A fuel cell according to claim 26, ~~wherein in which~~ the detection means comprises means for testing an open circuit voltage across the anode and cathode of the fuel cell.

28. (Currently Amended) A fuel cell system according to claim 24 ~~26~~, further ~~including~~ comprising:

control means for switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the

cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered to the anode together with oxidant delivered via the recirculation conduit.

29. (Currently Amended) A fuel cell system according to claim 26, further comprising:
~~21 further including~~ control means for switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered into the fuel delivery conduit together with oxidant delivered via the recirculation conduit.

30. (Currently Amended) A fuel cell system comprising including:
a fuel cell having an anode, a cathode, and an ion exchange membrane between the anode and the cathode therebetween;
a fuel delivery conduit for delivering preconditioned fuel to the anode, comprising:
a reaction chamber for reacting fuel and oxidant;
a fuel supply inlet for delivering fuel to the reaction chamber;
an oxidant supply inlet for supplying oxidant to the reaction chamber; and
a reaction chamber outlet connected to the anode;
wherein the reaction chamber ~~being is~~ adapted so that at least a part of the fuel supply delivered ~~thereto~~ to the reaction chamber is reacted with the oxidant supplied ~~thereto~~ to the reaction chamber to precondition the fuel being delivered to the anode;

wherein the fuel delivery conduit further comprises a recirculation conduit to supply oxidant from an output of the fuel cell to the reaction chamber; and

wherein the reaction chamber is configured to mix fuel from the fuel supply inlet with oxidant species from the recirculation conduit.

31. (Currently Amended) A fuel cell system according to claim 30, further comprising:
including control means for controllably varying the a flow rate of one or both of the fuel and oxidant from the oxidant supply inlet in order to achieve a predetermined degree of humidification of the a fuel stream delivered to the anode.

32. (Currently Amended) A fuel cell system according to claim 30 further comprising:
including control means for controllably varying the flow rate of one or both of the fuel and oxidant from the oxidant supply inlet in order to achieve a predetermined degree of pre-heat of the a fuel stream delivered to the anode.

33 to 36. (Cancelled)

37. (Currently Amended) A method of operating a fuel cell system having an anode, a cathode, and an ion exchange membrane between the anode and the cathode, the method therebetween, comprising the steps of:

supplying fuel from a fuel source to an active surface area of the anode ~~by way of~~ via a fuel delivery conduit; and

recirculating fluid within the fluid delivery conduit to a mixing point upstream of the active surface area of the anode; and

effecting a controlled combustion of fuel and oxidant species within the fuel delivery conduit at the mixing point.

38. (Canceled)

39. (Currently Amended) The method of claim ~~38 further including the step of~~ 37, further comprising:

consuming oxidant species at the mixing point, in a reaction chamber.

40. (Currently Amended) The method of claim 37, further comprising:
~~38 further including the step of~~ controllably varying the a quantity of fuel delivered to the mixing point.

41. (Currently Amended) A method of operating a fuel cell system comprising an anode, a cathode, and an ion exchange membrane between the anode and the cathode, the method comprising:

supplying fuel from a fuel source to an active surface area of the anode by way of a fuel delivery conduit;

effecting a controlled combustion of fuel and oxidant within the fuel delivery conduit;

and

~~The method of any one of claims 37 further including the step of~~ detecting a level of oxidant species present in at least part of the fuel delivery conduit.

42. (Currently Amended) The method of claim ~~38 further including the steps of~~ 37, further comprising:

switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered to the anode together with oxidant delivered in ~~the~~ recirculated fluid.

43. (Currently Amended) The method of claim ~~38 further including the steps of~~ 37, further comprising:

switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered into the fuel delivery conduit together with oxidant delivered in ~~the~~ recirculation fluid.

44. (Canceled)

45. (Currently Amended) The method of claim 37, further comprising:

~~44 further including the step of~~ controlling ~~the~~ a flow rate of one or both of the fuel and oxidant in order to achieve a predetermined degree of humidification of ~~the~~ a fuel stream delivered to the anode.

46. (Currently Amended) The method of claim 37, further comprising: ~~44 further including the step of~~

controlling ~~the~~ a flow rate of one or both of the fuel and oxidant in order to achieve a predetermined degree of pre-heat of ~~the~~ a fuel stream delivered to the anode.

47 to 50. (Canceled)